

# PATENT ABSTRACTS OF JAPAN

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(22)Date of filing : 19.12.1991 (72)Inventor : MIYAO KENJI

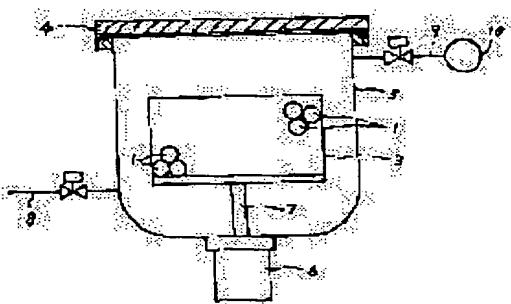
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## (54) DRYING METHOD FOR ARTICLE WASHED BY WATER

### (57)Abstract:

**PURPOSE:** To carry out drying of an article washed by water in a short time without occurrence of shading and oxidation of the surface.

**CONSTITUTION:** An article 1 washed by water is contained in a containing cylinder 3 having permeability. The containing cylinder 3 is first rotated in a state that a pressure in the containing cylinder 3 is reduced and draining is effected. High temperature steam is then caused to flow through the containing cylinder 3 to heat the article 1. Thereafter, the interior of the containing cylinder 3 is brought into a vacuum state and water still left adhered to the article 1 is vaporized.



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CLAIMS

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[Claim(s)]

[Claim 1] By making it rotate, where the inside of this receipt cylinder is decompressed, after containing the goods which were damp by washing bywater in the receipt cylinder which has the permeability established free [ rotation ] The dryness method of the goods washed bywater of draining off water from the above-mentioned goods, warming the above-mentioned goods by subsequently to in the above-mentioned receipt cylinder circulating a hot steam, making the inside of the above-mentioned receipt cylinder into a vacuum further, and drying the above-mentioned goods.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] The dryness method of the goods washed with the water concerning this invention is used, when drying this accessories article, afterwater (pure water) washes accessories articles, such as workpieces, such as contacts, such as a ball of a ball bearing, and a relay switch, a screw, and a nut, the minimum shaft.

[0002]

[Description of the Prior Art] Accessories articles, such as a ball of a ball bearing, are washing after manufacture, and have dropped the oil which adhered at the time of processing work. Although such washing was conventionally performed using organic solvents, such as chlorofluocarbon, performing washing by water is studied in consideration of the bad influence which the organic solvent has on earth environment in recent years.

[0003] However, since water cannot evaporate easily compared with organic solvents, such as chlorofluocarbon, the distance which dries a washed object becomes troublesome after dryness. If washing is performed where much accessories articles, such as a ball, are especially contained in a washing basket, as shown in drawing 3, it will mean that water 2 entered with as the adjacent accessories article 1 and the minute crevice which exists among one comrades. Thus, by capillarity, the water 2 which entered the minute crevice is \*\*\*\*(ed) in a minute crevice, and, below, does not flow down.

[0004] After washing the accessories article 1 and 1 contained in the washing basket for this reason, if it is going to dry still in the state in the state where it contained in this washing basket, in order that the drying time not only becomes long at \*\*, but the minute dust contained in the above-mentioned water 2 may focus and remain in the front face of the accessories article 1 and 1 with evaporation of water 2. dark circles will arise on the front face of this accessories article 1 and 1.

[0005] Although it can carry out without being a short time about dryness of the above-mentioned accessories article 1 and 1, and moreover making a front face produce dark circles by sending in a lot of hot blast at the time of dryness work, if the accessories article 1 and 1 is warmed washing away the above-mentioned water 2, since the front face of the accessories article 1 and 1 becomes easy to oxidize, the conditions which can be used will be restricted.

[0006] The dryness method of the goods washed with the water of this invention cancels such un-arranging.

[0007]

[Means for Solving the Problem] The dryness method of the goods washed with the water of this invention By making it rotate, where the inside of this receipt cylinder is decompressed, after containing the goods which were damp by washing bywater in the receipt cylinder which has the permeability established free [ rotation ] It drains off water from the above-mentioned goods, and by subsequently to in the above-mentioned receipt cylinder circulating a hot steam, the above-mentioned goods are warmed, the inside of the above-mentioned receipt cylinder is further made into a vacuum, and the above-mentioned goods are dried.

[0008]

[Function] When drying the goods washed bywater using the dryness method of the goods washed with the water of this invention constituted as mentioned above, the great portion of water adhering to the above-mentioned goods is removed from a goods front face by performing the ridge which rotates a receipt cylinder in the state where it decompressed, first. In case a receipt cylinder is rotated, the inside of this receipt cylinder is decompressed for moving the water which entered the minute crevice between adjacent goods to a front face, and making a water break good.

[0009] Subsequently, by sending in a hot steam in the above-mentioned receipt cylinder, the above-mentioned goods are warmed and water [ having still adhered to goods ] is evaporated by making the inside of a receipt cylinder into a vacuum further. The above-mentioned goods are warmed with a

steam, and since the temperature rise is carried out, the above-mentioned water evaporates in the inside of a short time.

[0010]

[Example] An example of the equipment for drawing 2 carrying out this invention for the flow chart with which drawing 1 shows the dryness method of this invention is shown, respectively. First, it explains briefly about the equipment shown in this drawing 2, and explains about the example which subsequently enforces this invention method using this equipment.

[0011] It is contained in the pressurized container 5 which can be freely sealed because the receipt cylinder 3 built in the side by the material which has permeability, such as a wire gauze, closes a lid 4. The receipt cylinder 3 can be freely rotated through the axis of rotation 7 by the motor 6 formed in the outside of a pressurized container 5. The sending pipe for 8 sending in a hot steam in a pressurized container 5 and 9 are the exhaust pipes for discharging the gas in a pressurized container 5, and the end of this exhaust pipe 9 is connected to the inhalation mouth of a vacuum pump 10.

[0012] Next, it explains about the dryness method of this invention carried out using the above-mentioned equipment. If the accessories article 1 and 1 which was damp by washing bywater in the receipt cylinder 3 is contained, the inside of a pressurized container 5 will be decompressed by operating a vacuum pump 10 as Step 1. And where the inside of a pressurized container 5 is decompressed, it energizes on a motor 6 and the receipt cylinder 3 is rotated through the axis of rotation 7. Consequently, a centrifugal force separates the great portion of water adhering to the accessories article 1 and 1 in the receipt cylinder 3 from the accessories article 1 and 1. The ridge in this step 1 is effectively performed by decompressing the inside of a pressurized container 5, and ecrisis of water which entered in the adjacent accessories article 1 and the minute crevice which exists among one comrades is also fully performed.

[0013] If the ridge by the predetermined time and the above-mentioned centrifugal separation is performed, operation of a motor 6 and a vacuum pump 10 will be stopped, subsequently it will send in from the source of a steam which is not illustrated as Step 2, and a hot steam will be sent in in a pressurized container 5 through a pipe 8. Sending of this steam is performed in order to warm the accessories article 1 and 1 in the receipt cylinder 3. In addition, it is made for a lot of [ surface water / again ] water in the removed accessories article 1 and 1 not to adhere to the temperature of the accessories article 1 and 1 reaching a predetermined value, as for the amount of the steam to send in by the ridge by the centrifugal separation in the above-mentioned step 1 as a necessary minimum amount.

[0014] However, when a small amount of moisture adheres to the front face of this accessories article 1 and 1, before moving to the following vacuum-drying distance, the receipt cylinder 3 can be again rotated through the axis of rotation 7 by the aforementioned motor 6, and ridge work can also be done. because some steams condense on the front face of the accessories article 1 and 1. In addition, you may do this centrifugal ridge work simultaneously with heating of the accessories article 1 and 1 by the steam.

[0015] If the accessories article 1 and 1 carries out a temperature rise even to predetermined temperature, sending of a steam will be stopped and it will progress to Step 3. In this step 3, by operating a vacuum pump 10, the inside of a pressurized container 5 is made into a vacuum, and the accessories article 1 and 1 is dried. Since the temperature rise of this accessories article 1 and 1 is carried out by sending of the steam in the above-mentioned step 2, dryness is performed quickly. Consequently, dark circles arise on the front face of the accessories article 1 and 1. or it is lost that the front face of this accessories article 1 and 1 oxidizes to the grade which a problem produces practically. After a dryness end cools the above-mentioned accessories article 1 and 1 by the cooling method learned from the former, and takes out.

[Effect of the Invention] Since it is constituted as stated above, and it acts, the dryness method of the goods washed with the water of this invention is a short time about dryness of the goods washed with water, and it can be performed, without moreover oxidizing a front face, without making a front face produce dark circles.

[0017] In addition, the same dryness method as this invention is applicable not only to dryness of the goods washed bywater but dryness of the goods washed by organic solvents, such as chlorofluocarbon. However, compared with dryness of the goods washed bywater, since it is easy, as for dryness of the goods washed by the small organic solvent of the latent heat of vaporization compared with water, the case of this invention cannot acquire a big effect.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The flow chart which shows this invention.

[Drawing 2] Schematic drawing showing an example of the equipment for carrying out this invention.

[Drawing 3] Drawing showing the state where water adhered between goods.

[Description of Notations]

1 Accessories Article

2 Water

3 Receipt Cylinder

4 Lid

5 Pressurized Container

6 Motor

7 Axis of Rotation

8 Sending Pipe

9 Exhaust Pipe

10 Vacuum Pump

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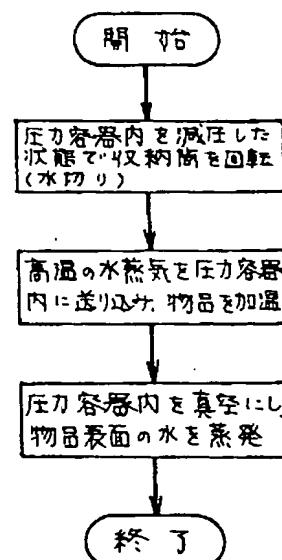
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(54)【発明の名称】 水により洗浄した物品の乾燥方法

(57)【要約】

【目的】水で洗浄した物品の乾燥を短時間で、表面に限らず生じさせたり表面を酸化させたりする事なく行なう。

【構成】水で洗浄した物品を通気性を有する収納筒内に納める。先ず、収納筒内を減圧した状態で収納筒を回転させ、水切りを行なう。次いで、収納筒内に高温水蒸気を流通させ、上記物品を加温する。その後、収納筒内を真空にし、未だ、物品に付着したままの水を蒸発させる。



(2)

## 【特許請求の範囲】

【請求項1】回転自在に設けられた通気性を有する収納筒内に、水により洗浄する事で濡れた物品を収納した後、この収納筒内を減圧した状態で回転させる事により、上記物品の水切りを行ない、次いで上記収納筒内に高温の水蒸気を流通させる事により、上記物品を加温し、更に上記収納筒内を真空にして上記物品を乾燥させる、水により洗浄した物品の乾燥方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】この発明に係る水により洗浄した物品の乾燥方法は、ボールベアリングのボール、リレースイッチ等の接点、螺子やナット、極小シャフト等の加工品等の小物品を水（純水）により洗浄した後、この小物品を乾燥する場合に利用する。

## 【0002】

【従来の技術とその問題点】ボールベアリングのボール等の小物品は、製造後洗浄する事で、加工作業時に付着した油を落している。この様な洗浄作業は、従来はフロン等の有機溶剤を使用して行なっていたが、近年有機溶剤が地球環境に及ぼす悪影響を考慮して、水による洗浄作業を行なう事が研究されている。

【0003】ところが、水はフロン等の有機溶剤に比べて蒸発しにくい為、乾燥後、被洗浄物を乾燥する行程が面倒になる。特に、洗浄籠内にボール等の小物品を多数収納した状態で洗浄作業を行なうと、図3に示す様に、隣り合う小物品1、1同士の間に存在する微小隙間に水2が入り込んだままとなる。この様に微小隙間に入り込んだ水2は、毛細管現象によって微小隙間に滞留し、下方には流下しない。

【0004】この為、洗浄籠に収納した小物品1、1を洗浄後、この洗浄籠に収納した状態のまま乾燥しようとすると、乾燥時間が従に長くなるだけでなく、上記水2に含まれる微小な塵が、水2の蒸発に伴なって小物品1、1の表面に集中して残る為、この小物品1、1の表面に限が生じてしまう。

【0005】乾燥作業時に多量の熱風を送り込む事で、上記水2を押し流しつつ小物品1、1を加温すれば、上記小物品1、1の乾燥を短時間で、しかも表面に限を生じさせる事なく行なえるが、小物品1、1の表面が酸化し易くなる為、使用出来る条件が限られてしまう。

【0006】本発明の水により洗浄した物品の乾燥方法は、この様な不都合を解消するものである。

## 【0007】

【問題を解決するための手段】本発明の水により洗浄した物品の乾燥方法は、回転自在に設けられた通気性を有する収納筒内に、水により洗浄する事で濡れた物品を収納した後、この収納筒内を減圧した状態で回転させる事により、上記物品の水切りを行ない、次いで上記収納筒内に高温の水蒸気を流通させる事により、上記物品を加温する、水により洗浄した物品の乾燥方法。

温し、更に上記収納筒内を真空にして上記物品を乾燥させるものである。

## 【0008】

【作用】上述の様に構成される本発明の水により洗浄した物品の乾燥方法を用いて、水により洗浄した物品を乾燥させる場合、先ず、収納筒を、減圧した状態で回転させる、水切りを行なう事により、上記物品に付着していた水の大部分を、物品表面から取り除く。収納筒を回転させる際、この収納筒内を減圧するのは、隣り合う物品10同士の間の微小隙間に入り込んだ水を表面に移動させ、水切れを良好にする為である。

【0009】次いで、上記収納筒内に高温の水蒸気を送り込む事により、上記物品を加温し、更に収納筒内を真空にする事で、未だ物品に付着したままの水を蒸発させる。上記物品は、水蒸気によって加温され、温度上昇している為、上記水は短時間の内に蒸発する。

## 【0010】

【実施例】図1は本発明の乾燥方法を示すフローチャートを、図2は本発明を実施する為の装置の一例を、それ20ぞれ示している。先ず、この図2に示した装置に就いて簡単に説明し、次いでこの装置を用いて本発明方法を実施する例に就いて説明する。

【0011】側面を金網等、通気性を有する材料により造られた収納筒3は、蓋体4を閉じる事で密閉自在な圧力容器5内に収納される。収納筒3は、圧力容器5の外側に設けたモータ6により、回転軸7を介して回転自在である。8は、圧力容器5内に高温の水蒸気を送り込む為の送り込み管、9は、圧力容器5内の気体を排出する為の排出管で、この排出管9の一端は真空ポンプ10の30吸入口に接続している。

【0012】次に、上記した装置を用いて実施される本発明の乾燥方法に就いて説明する。収納筒3内に、水により洗浄する事で濡れた小物品1、1を収納したならば、ステップ1として、真空ポンプ10を運転する事により、圧力容器5内を減圧する。そして、圧力容器5内を減圧した状態で、モータ6に通電し、回転軸7を介して収納筒3を回転させる。この結果、収納筒3内の小物品1、1に付着していた水の大部分は、遠心力により小物品1、1から分離する。このステップ1に於ける水切りは、圧力容器5内を減圧している事により効果的に行なわれ、隣り合う小物品1、1同士の間に存在する微小隙間に入り込んだ水の排出も十分に行なわれる。

【0013】所定時間、上記した遠心分離による水切りを行なったならば、モータ6、真空ポンプ10の運転を停止し、次いでステップ2として、図示しない蒸気源より送り込み管8を介して圧力容器5内に、高温の水蒸気を送り込む。この水蒸気の送り込みは、収納筒3内の小物品1、1を加温する為に行なう。尚、送り込む水蒸気の量は、小物品1、1の温度が所定値に達するのに必要50最小限の量として、上記ステップ1に於ける遠心分離に

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より水切りによって表面の水が取り除かれた小物品1、1に、再び多量の水が付着しない様にする。

【0014】但し、水蒸気の一部が小物品1、1の表面で凝縮する事で、この小物品1、1の表面に少量の水分が付着する様な場合には、次の真空乾燥行程に移る前に、再び前記モータ6により回転軸7を介して収納筒3を回転させ、水切り作業を行なう事も出来る。尚、この遠心水切り作業は、水蒸気による小物品1、1の加熱と同時に行なっても良い。

【0015】小物品1、1が所定温度に迄温度上昇したならば、水蒸気の送り込みを停止し、ステップ3に進む。このステップ3に於いては、真空ポンプ10を運転する事により、圧力容器5内を真空にし、小物品1、1を乾燥させる。この小物品1、1は、上記ステップ2に於ける水蒸気の送り込みにより温度上昇している為、乾燥は迅速に行なわれる。この結果、小物品1、1の表面に限が生じたり、この小物品1、1の表面が実用上問題が生じる程度に酸化する事がなくなる。乾燥終了後は、従来から知られた冷却方法により上記小物品1、1を冷却し、取り出す。

【0016】

【発明の効果】本発明の水により洗浄した物品の乾燥方法は、以上に述べた通り構成され作用する為、水で洗浄した物品の乾燥を短時間で、表面に限を生じさせる事な

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く、しかも表面を酸化させたりする事なく行なえる。

【0017】尚、本発明と同様の乾燥方法は、水により洗浄した物品の乾燥だけでなく、フロン等の有機溶剤により洗浄した物品の乾燥にも適用可能である。但し、水に比べて蒸発潜熱の小さい有機溶剤により洗浄した物品の乾燥は、水により洗浄した物品の乾燥に比べて容易である為、本発明の場合程、大きな効果を得る事は出来ない。

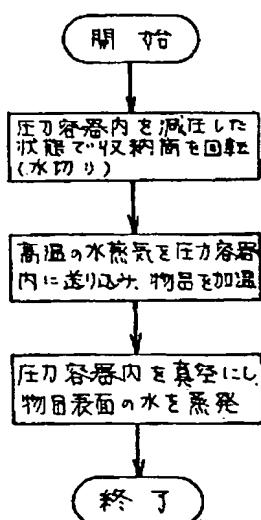
#### 【図面の簡単な説明】

10 【図1】本発明を示すフローチャート。  
 【図2】本発明を実施する為の装置の一例を示す略図。  
 【図3】物品の間に水が付着した状態を示す図。

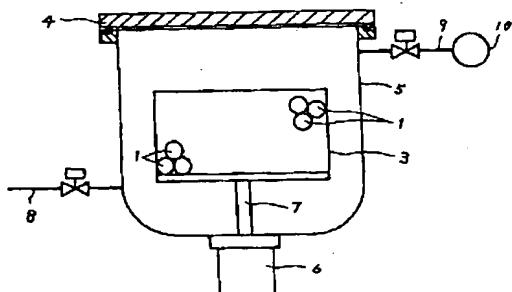
#### 【符号の説明】

1 小物品  
 2 水  
 3 収納筒  
 4 蓋体  
 5 圧力容器  
 6 モータ  
 7 回転軸  
 8 送り込み管  
 9 排出管  
 10 真空ポンプ

【図1】



【図2】



【図3】

